Building Societal Consensus on Biotechnology: A Research and Education Initiative

The first two decades of the 21st century will be a watershed for public sector research in agriculture as several of the key assumptions of Land Grant and USDA research are increasingly challenged. These assumptions are listed below.

1. *The essentially beneficial character of new technologies*. Until recently it was assumed by both scientists and the general public that scientific research was always a good thing. While some persons have always challenged this assumption, may question it now, both within and outside the scientific community. Even within economics, where the neutrality of technology was taken as given, now it is widely accepted that technologies have costs, risks and benefits associated with them and these are not distributed evenly across the population.

2. *The acquiescence of the general public in the face of new technologies*. In the past, the general public acquiesced to new technologies even though they might be destructive of some persons' ways of life. For example, the interstate highway system cut through the hearts of most US cities and destroyed countless neighborhoods before residents began to complain that it was in some places unnecessary and destructive. Today, segments of the public are raising similar complaints about the agrifood system and they are demanding a greater voice in how it is managed.

3. *The unity of the scientific community*. In the past, the scientific community was unified as to the directions that agriculture should take: higher productivity, greater industrialization, economies of scale, greater efficiency of labor use, etc. Today, scientists in the same fields disagree as to the goals of agricultural science. In addition to the well-established production orientation, virtually every agronomy department in the nation has several molecular biologists as well as several organic agriculture enthusiasts, and perhaps an agroecologist thrown in for good measure.

4. *The sharp separation between the natural and social sciences*. In the past, the "production sciences" were to develop the means to increase productivity, while the social sciences were to get the word out through improved farm management, faster adoption of innovations, and modernization of farm families. This separation no longer works as it is increasingly recognized that all technical changes are *simultaneously* social changes. Yet, neither USDA nor the LGUs have figured out how to put together interdisciplinary teams to grapple with these spillovers.

5. *What is good for farmers is good for consumers*. As long as low cost food was the central objective for science, one could claim that consumers benefitted from all production research. However, as the current debates over biotechnology illustrate, many consumers no longer see it that way. Moreover, since the cost of food is dwarfed by the cost of transport, processing, packaging and other input supply and post-harvest activities, cost reduction is not really a very viable strategy for satisfying consumers anymore.

6. *LGUs and USDA work for the direct benefit of farmers (and, by implication, consumers).* In past times, it appeared self-evident that the technologies developed by LGUs and USDA were designed to serve the farming community. This is no longer the case. For better or for worse, the advent of the new biotechnologies, combined with new intellectual property rights and growing

concentration in the input supply and post-harvest industries, has left many scientists developing products that must be marketed to industry – not to farmers. In addition, much of what used to be done by extension is now done by industry in the form of crop consultants, crop-chemical packages, and other specialized professionals and technological packages.

7. *Most agricultural scientists come from farm backgrounds.* In the past, scientists could be expected to understand farm management and operations since they themselves often grew up on farms. Today, however, as a result of the decline in the size of the farm population, this can no longer be assumed. Agricultural scientists will need to learn how farms and the agrifood system are organized, what is at stake for various actors, and what is economically viable on farms.

8. *Whatever is economically viable for farmers is socially acceptable.* Until recently, any type of innovation that was economically viable for farmers was assumed to be socially acceptable. However, today, we can no longer assume that this is the case. Farm practices, from confinement production of animals to the use of genetically modified crops, may be deemed unacceptable by downstream actors.

In sum, it is gradually becoming apparent that the rules of the game are changing. If the LGUs and the USDA do not get ahead of the curve on these changes, then they will face far greater opposition than what is now faced with respect to GMOs. Yet, the LGUs continue to develop "educational programs" based on the erroneous view that public education about science will make these problems go away. It will not do that because the issue is not merely one of education but also one of *voice*. We need to develop new and better means for giving voice to the public at large in the formation of agricultural research policy. We have been very effective in doing this with respect to farm and commodity organizations, but have hardly considered the issues involved with respect to other publics.

Therefore, social science research on biotechnology must address some far more difficult questions: (1) What are the strengths and weaknesses of various approaches to giving the public voice in research policy? (2) How can we better understand the consequences of new technologies *ex ante*? (3) How can LGU and USDA policies become more responsive and proactive with respect to public concerns? (4) How can safety and environmental standards for new technologies be made more transparent and unambiguous? (5) What are the limits to science in decision making about the public good? (6) How can the training of agricultural scientists (including those social scientists interested in agrifood issues) be modified so as to better address these issues in the future? (7) How can the LGUs and USDA learn to live with an ever more fractious set of publics?

One can view the situation as illustrated in the figure below. Technoscientific capacity is such that research products can be developed that are uneconomical, environmentally problematic, and/or socially unacceptable. The challenge is twofold: On the one hand, there is a growing need for research that fits within the area in which the four ellipses overlap, i.e., technologies that are scientifically sound, economically viable, environmentally sustainable, and socially acceptable. On the other hand, we need to enlarge the area where the ellipses overlap. This can only be done by debate and dialogue that simultaneously shifts emphases of research scientists, clarifies what is of concern to various stakeholders, and results in growing agreement over what must be done to improve the agrifood system as a result of a process of learning on the part of all parties. Furthermore, research needs to be undertaken to further this process as follows:

How can we increase civic engagement in determining the directions for and disseminating new technologies?

The investigative development of new technologies from scientific inquiry requires a research agenda focused on engaging the stakeholders impacted by the technology. Specific research questions to address this issue include: (1) What factors influence the motivation to accept or reject biotechnologies? (2) How does the prospect for new technology directly or indirectly impact engagement of stakeholders? (3) What is the relationship between acceptance of biotechnology and stakeholder engagement in determining the development of new technologies? (4) What are the barriers to stakeholder engagement in determining and disseminating new technologies? (5) What are the specific needs of stakeholders regarding the level of engagement desired in determining and disseminating new technologies? In addition, educational activities designed to increase civic engagement are proposed (e.g., conferences, seminars, workshops designed to increase stakeholder input).

How do stakeholders (e.g., farmers, those in industry, educators, consumers, and others in various publics) get access to, use, and act upon information regarding biotechnologies?

- What patterns of communication are exhibited when communicating (e.g., interpersonal, small group, mass mediated)?

- What role, if any, do opinion leaders play?

- What groups build identities based on biotechnologies?

- What opinions and attitudes are formulated concerning biotechnology (e.g., what are the attitudinal dimensions – perceived risk, etc.)?

- How malleable are those opinions and attitudes?

- What individual and group characteristics (e.g, religious, cultural, political activist) are associated with various opinion/attitude positions?

- What degrees/levels of biotechnologies knowledge are held by various types of individuals and groups?

- What are the correlations between degrees and types of knowledge acquired and biotechnology-related behaviors? Between opinions, attitudes, and behaviors?

- How difficult is it for various individuals to change their biotechnology-related behaviors? Who are the early adopters? Late adopters? Non-adopters?

- How is conflict between individuals and groups on biotechnologies expressed? Can such conflict be resolved via mediation? If so, what techniques are most effective?

- What mass media of communication are most effective as agents of knowledge and persuasion with what types of individuals and groups? What is their credibility (e.g., books, magazines, radio, television, internet, as well as various format/programming approaches with these individual media)?

- Are opinions, attitudes, behaviors consistent across a range of biotechnology phenomena?

- What do public officials, industry leaders, key educators, and other leaders/decision-maker know about public opinion, attitudes and behaviors? How does this knowledge factor into action agendas?

- How can the public be actively engaged in robust dialogue concerning biotechnology issues? How can such a dialogue become part of decision-making which is perceived as equitable, just, and fair (by at least a majority)?

- What effective mechanisms can be instituted to enable decision-makers to be aware of public perspectives regarding biotechnologies?

- Are negative biotechnology attitudes associated with other clusters of attitudes (e.g., mistrust of government and the political process, civic disengagement)?

- Are consumers skeptical of or accepting of social marketing approaches to engineering social change (e.g., mass persuasion campaigns)? What difference does the perceived source of message make in such campaigns (e.g., government source, scientific group, consumer groups, etc.)?

- What level of discourse is most effective in reaching the largest number of people concerning biotechnology (e.g., vocabulary, degree of creativity, role of graphics and visuals, other message considerations)?

- Based on the above research, redesign of these education programs and development of new delivery strategies is proposed to inform and engage stakeholders about issues surrounding biotechnologies. As a result, stakeholders will become better informed decision makers.

What are the risks and benefits as perceived by stakeholder groups, including scientists, producers, journalists, and public groups?

- What are the perceived risks-benefits of bt/gmo (proteinomics) as related to human health? What are the attitudes?

- What are the perceived risks/benefits related to environmental sustainability? (Concern about translocated genetic traits and environmental biodiversity)

- How can the evaluation processes be communicated to stakeholder groups?

- How do stakeholder groups weigh risks/benefits in adoption decisions? (What are community values that resonate with bt/gmo)

- What knowledge-exchange (education & communications) strategies are effective in developing analytical decision making skills among stakeholder groups?

- Based on the above research, it is proposed that stakeholder groups will learn how to be better engaged in evaluating the risks and befits of biotechnological research including sound science, economic viability, social concerns, and environmental sustainability.

How can research and education better predict the potential outcomes/consequences of new biotechnologies at the initial stages of their development?

- The issue will be to bring social, biological, and life scientists together to discuss/plan/implement research. Public versus private research, who controls.

- The issue will be to develop a model or framework for posing important issues/questions that recognizes/includes economic impacts, environmental impacts, social impacts as well as the production/marketing/consumption effects.

<u>Research questions to be explored:</u>

- What better means can be developed for assessing the consequences of new biotechnologies with respect to their technological soundness, economic viability, social acceptability, and environmental sustainability?

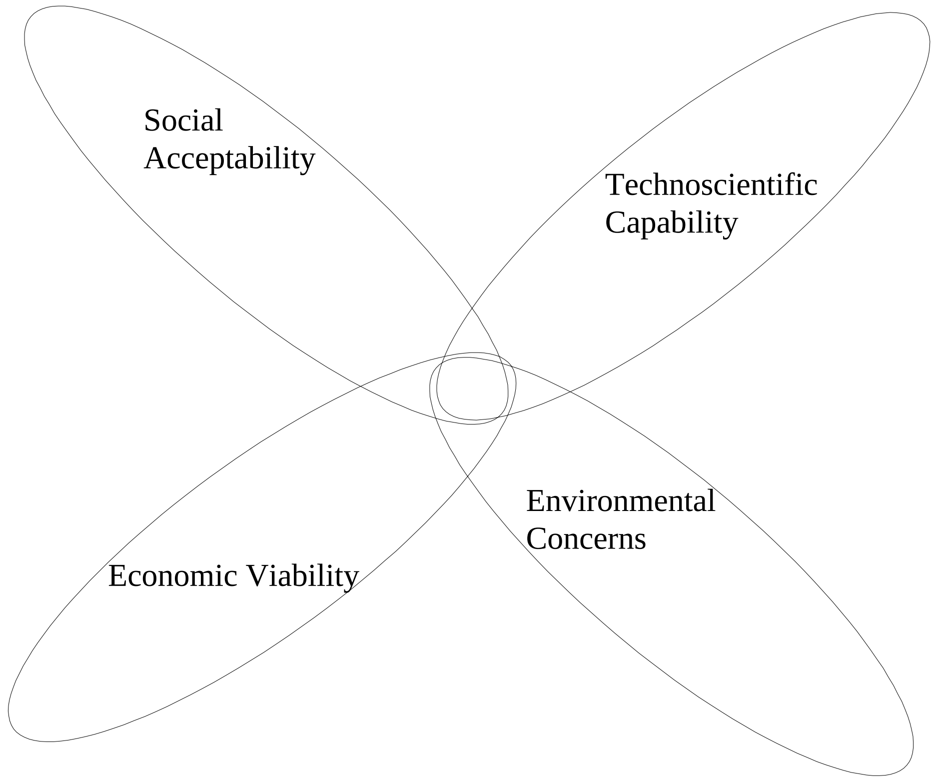
- What literature exists that predicts ex ante outcomes of research in general, biotechnology in particular?

- What information of past successes and/or failures of research leading to product development leading to marketing/sales/education/use resulting in various effects or impacts (social, economic, environmental) can we bring to bear on predicting future successes/failures?

Based on the research above, the full range of potential stakeholders will become involved and participate in the assessment of proposed new technologies in partnership with scientists will be essential.

Budget:

We propose a multiagency (e.g., USDA, NIH, NSF,EPA) competitive grants program of $30 million per year to start ramping $10 million per year to a maximum of $60 million.


Social
Acceptability
Technoscientific
Capability
Environmental
Concerns
Economic Viability